

Engineering nitrogen-fixing plants: multigene transfer, targeting of expression to organelles and tissues, and other challenges.

Biological N₂ fixation, catalyzed by the prokaryotic enzyme nitrogenase, is an alternative to the use of synthetic N fertilizers to increase cereal production yields. The strategy we are pursuing in an effort to increase cereal crops productivity is the direct transfer of nif prokaryotic genes into cereals. Because Nitrogenase is an O₂-labile metalloenzyme which biosynthesis requires a complex pathway where numerous nif gene products are involved, the main challenges we face are the control of gene expression and protein accumulation in an O₂ depleted environment and the stable and high expression of multiple transgenes. Our efforts are now focused on controlling expression targeting to different tissues and organelles and on studying the signals in transgenes that license gene silencing.